10

Monitor Agent

Enterprise Net

Local Plant Area

20

Managed Ethernet Switch

Port 1   Port 9

25

HUB

PORT   PORT   PORT

40

HUB

PORT   PORT   PORT

45

I/O

I/O

50

I/O

I/O

PLC

PC

I/O

60

FIG 1

10

Monitor Agent

Enterprise Net

Local Plant Area

Managed Ethernet Switch

20

Port 1   ...   Port 9

HUB

PORT1   PORT 2   PORT 3   40

HUB

70

I/O

MAC = ABC
IP = 10.0.0.1

80

I/O

MAC = DEF
IP = 10.0.0.2

I/O

MAC = EFG
IP = 10.0.0.3
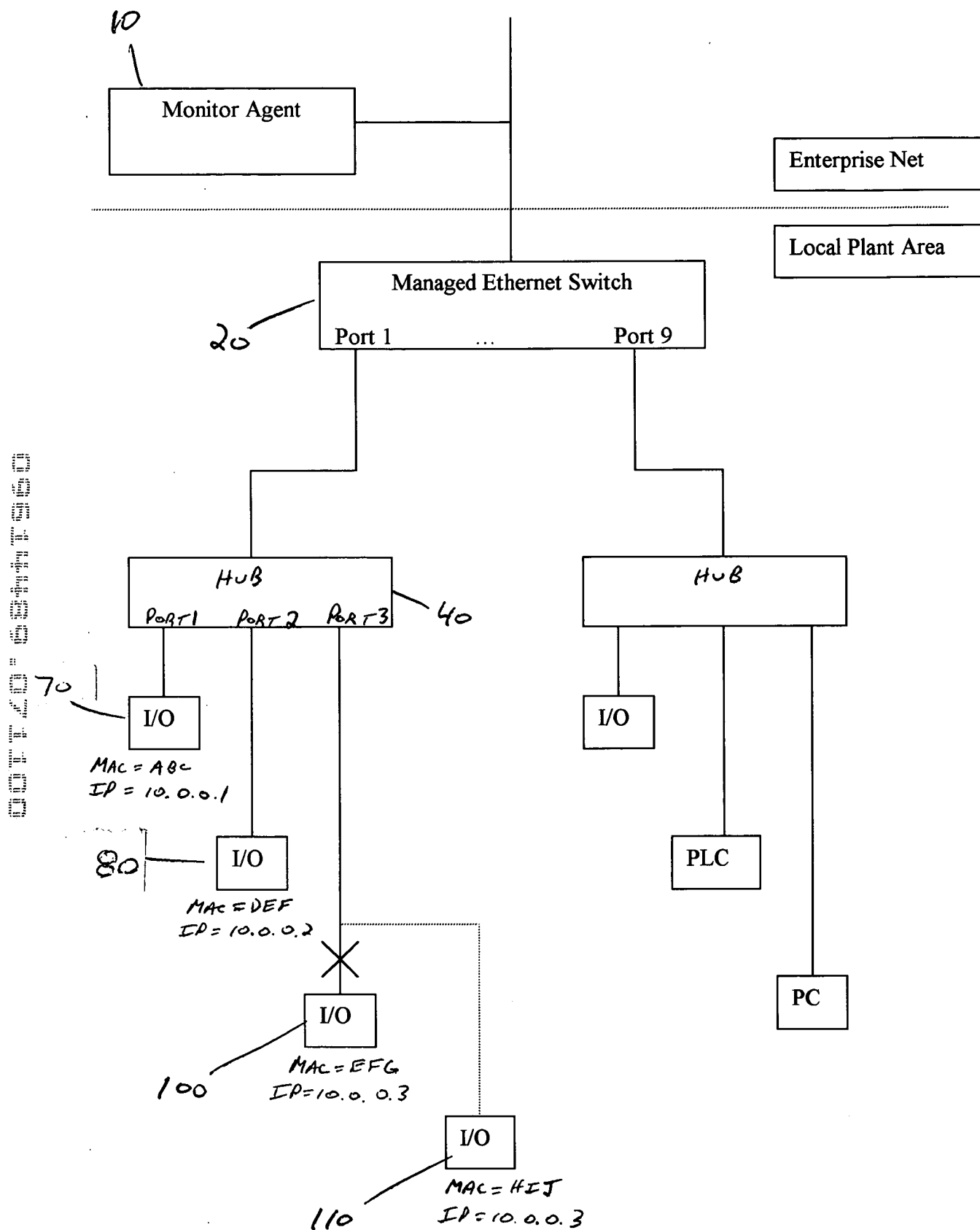
100

I/O
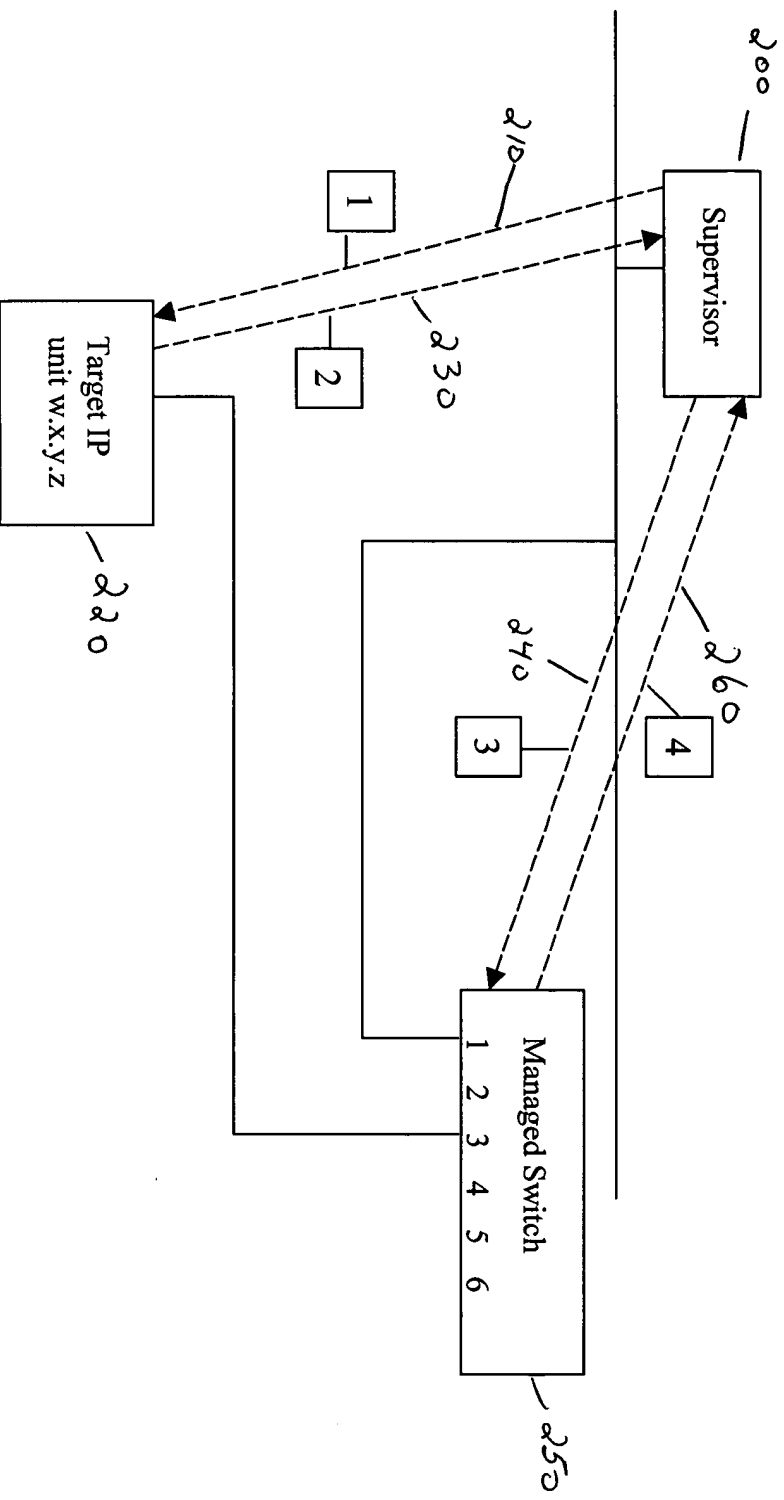
PLC

PC

I/O

MAC = HIJ
IP = 10.0.0.3

110

FIG 2

Discovery / confirmation sequence. Find MAC address of target and record its canonical location (numbered port of supervised switch) Dedicated port scenario

200

210

1

230

2

Supervisor

Target IP
unit w.x.y.z

220

240

3

260

4

Managed Switch
1 2 3 4 5 6

250

1. ARP Request - inquire MAC address of IP address w.x.y.z (broadcast)
2. ARP response - MAC address of requested IP address is xxx
3. SNMP Findport request - request port number of MAC xxx
4. SNMP Findport response - port number of MAC xxx was 3

FIG. 3

Discovery / confirmation sequence. Find MAC address of target and record its canonical location (numbered port of supervised switch). Shared port scenario.
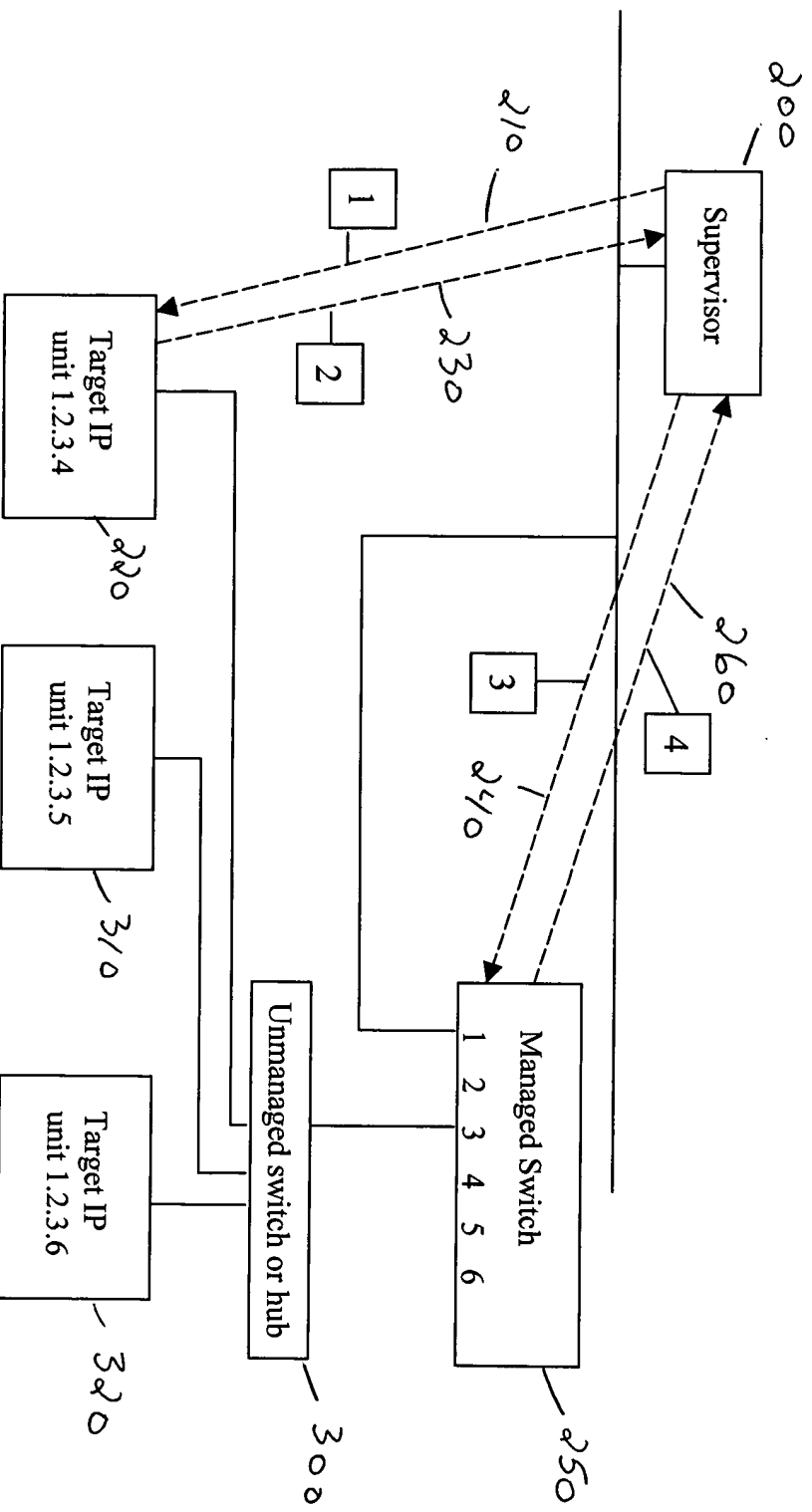
1. ARP Request - inquire MAC address of selected IP address 1.2.3.4 (unicast) (broadcast)
2. ARP response - MAC address of requested IP address is xxx
3. SNMP Findport request - request port number of MAC xxx
4. SNMP Findport response - port number of MAC xxx was 3
Targets are automatically determined to be sharing port 3 of the switch.

FIG 4

Confirm presence sequence - interrogate target at periodic interval. Absence of response indicates target 'down'. A single target down in a canonical location becomes a reassignment candidate. Dedicated port scenario.

200

210

230

1

2

Supervisor

Target IP
unit

220

X

Managed Switch
1 2 3 4 5 6
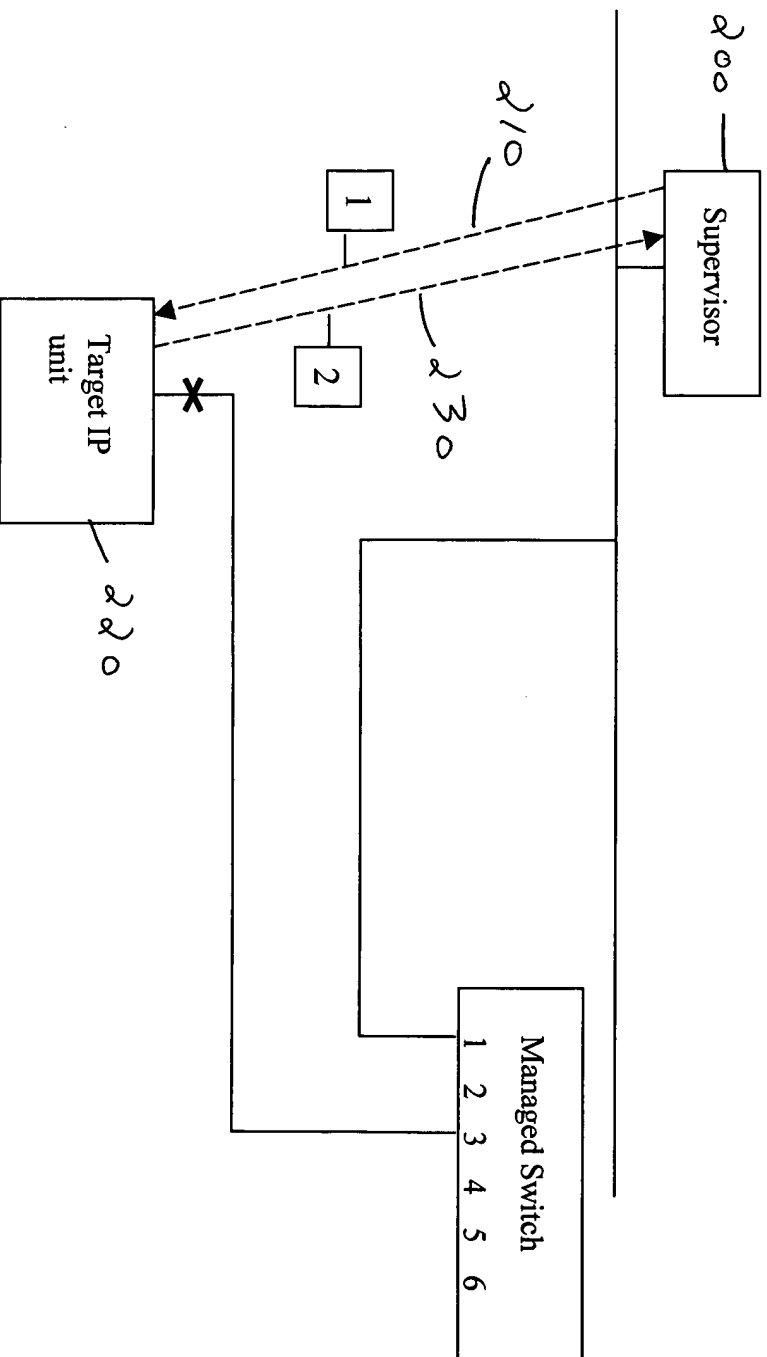
1. ARP Request - inquire MAC address of selected IP address (unicast)
2. ARP response - MAC address of requested IP address is xxx
If no response is received, signify that the target IP unit is 'down'

FIG 5

Confirm presence sequence - interrogate target at periodic interval. Absence of response indicates target 'down'. A single target down in a canonical location becomes a reassignment candidate. Shared port scenario.

200

210

1

2

230

220

Supervisor

Target IP
unit 1.2.3.4

Target IP
unit 1.2.3.5

310

Target IP
unit 1.2.3.6

320

Unmanaged switch or hub

300

Managed Switch
1 2 3 4 5 6

250

1. ARP Request - inquire MAC address of selected IP address 1.2.3.6 (unicast)
2. ARP response - MAC address of requested IP address is xxx
If no response is received, signify that the target IP unit is 'down'
If 1.2.3.6 is the ONLY unit on port 3 of the switch which is down, then it is a candidate for automatic reallocation. If any of the other units found on this port are also down, automatic reallocation will be suppressed.
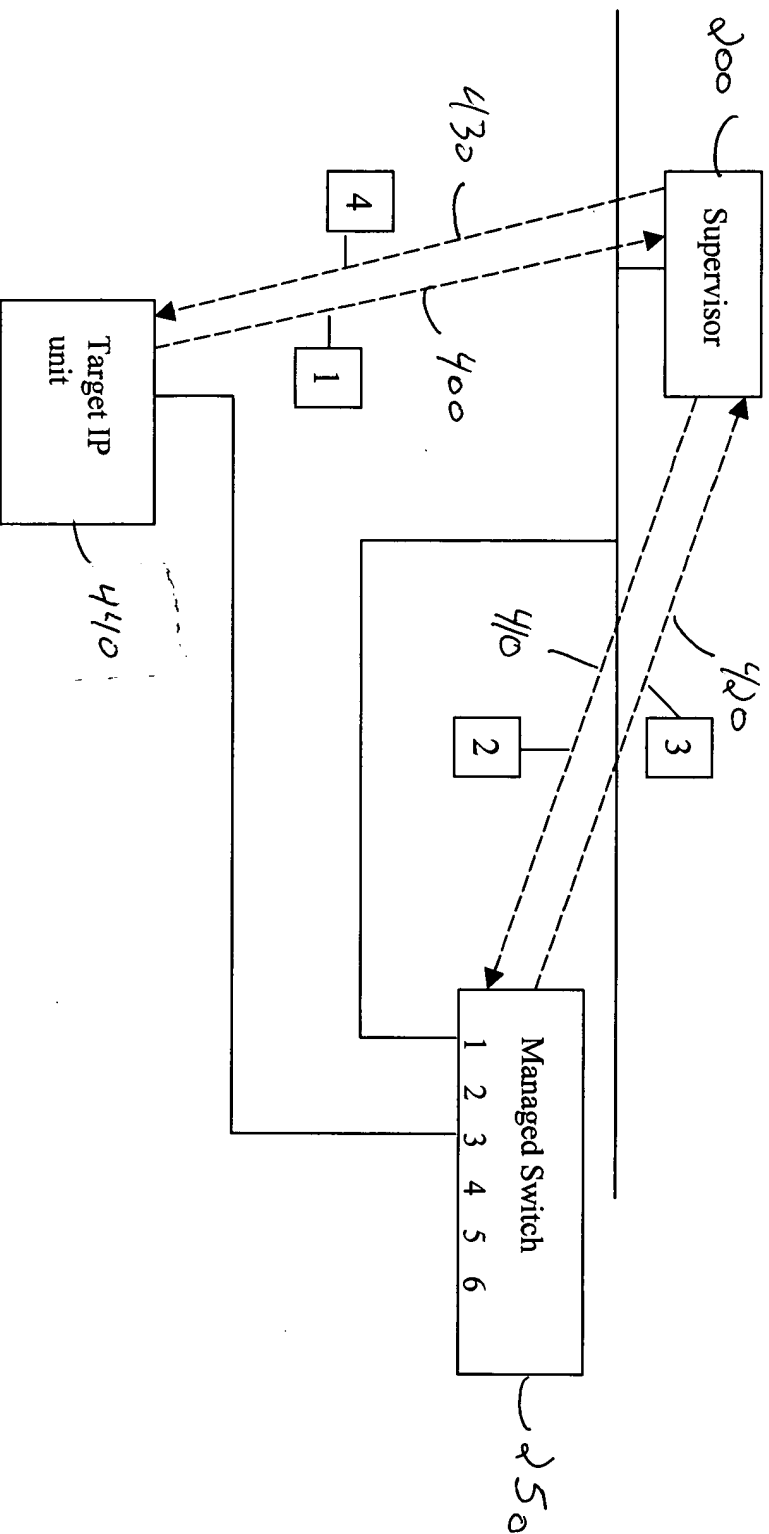
FIG 26

IP address assignment sequence. Target IP broadcasts request for address. The target was previously running at that location (eg. just reset or power cycled)
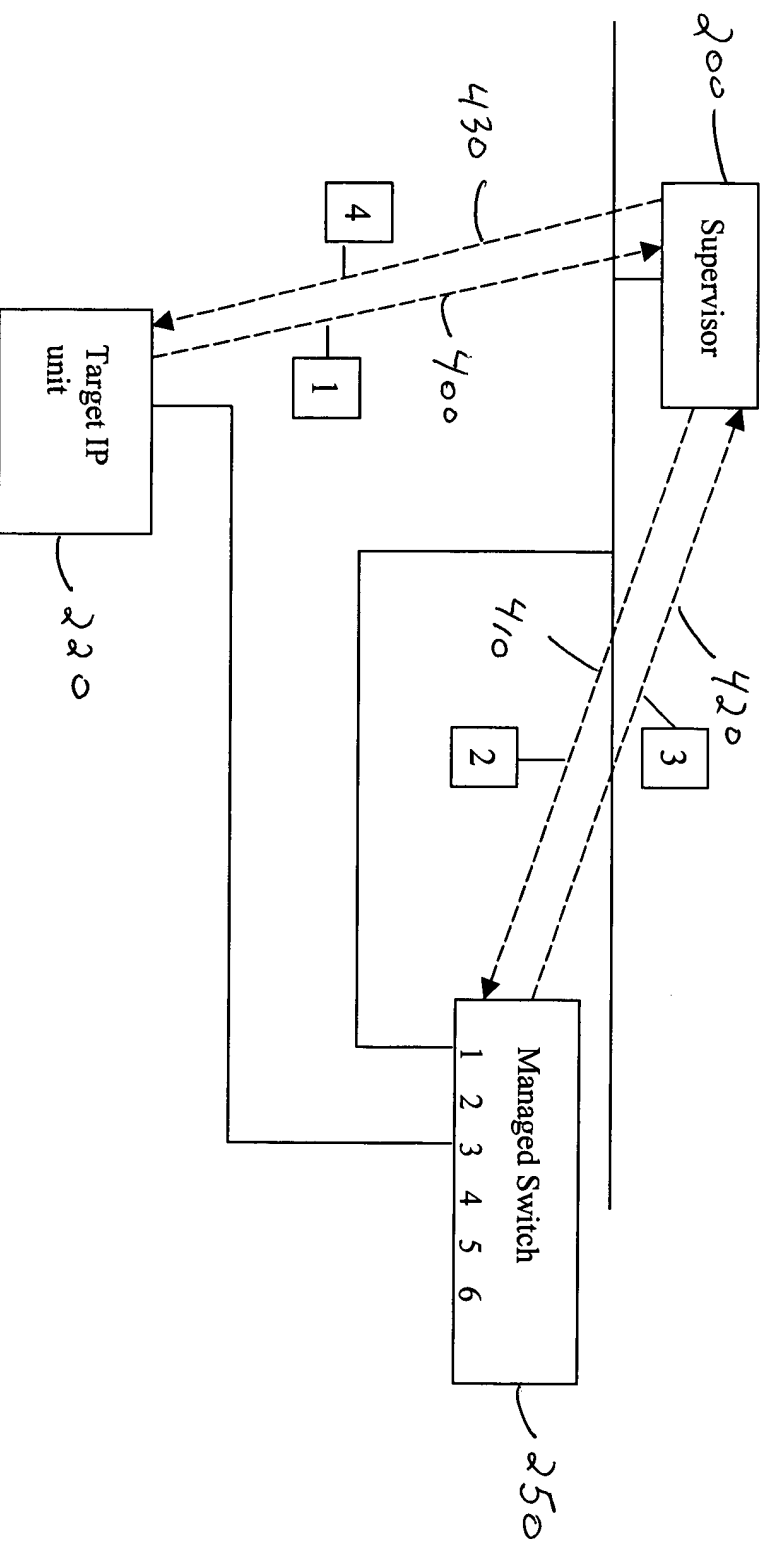
200

430

4

Supervisor

Target IP unit

1

400

410

2

420

3

Managed Switch
1 2 3 4 5 6

220

250

1. BOOTP request - please supply IP address for MAC xxx (broadcast)
2. SNMP Findport request - request port number of MAC xxx
3. SNMP Findport response - port number of MAC xxx was 3
(MAC xxx already associated with IP at that canonical location - OK to assign)
4. BOOTP response - IP address for MAC xxx is w.x.y.z

FIG 7

IP address reassignment sequence. Target IP broadcasts request for address. The target was NOT previously running at that location. A single target IP unit at that location is determined to be currently 'down', and is assumed to have been replaced with another using the same cable.

200

430

400

4

1

Supervisor

Target IP unit

410

440

410

420

2

3

Managed Switch
1 2 3 4 5 6

250

1. BOOTP request - please supply IP address for MAC xxx (broadcast)
2. SNMP Findport request - request port number of MAC xxx
3. SNMP Findport response - port number of MAC xxx was 3
   (MAC xxx not known. However a **single** unit at that location is not currently responding. Update
   BOOTP equivalence table to record new IP assignment and authorize assignment)
4. BOOTP response - IP address for MAC xxx is w.x.y.z

FIG 8